Synergistic antibacterial effects of methanolic extract of *Melissa officinalis* L. and Mouthwash Vi-one on *Streptococcus mutant* and *Streptococcus sanguinis*

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ABSTRACT

Introduction: The use of chemical and vegetable compounds reduces the microbial plaque of the tooth. The aim of this study was to investigate the synergistic antibacterial effects of methanolic extract of *Melissa officinalis* L. (*Lemon balm*) and mouthwash Vi-one on *Streptococcus mutant* and *Streptococcus sanguinis*.

Methods: Methanolic extract of lemon balm was prepared by Soxhlet method. The concentrations of 250, 125, 62.5, 31.25, 15.26, 7.81, 3.9, 1.95, 0.97 and 0.48 mg/ml of methanol extract and mouthwash prepared and mixed in the same proportion. Agar well diffusion, minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC) were used to determine the antibacterial effect.

Results: The highest non-growth zones were 21 mm for *Streptococcus mutant* and 22 mm for *Streptococcus sanguinis* which observed at a concentration of 250 mg/ml. The best value of MIC and the MBC for both bacteria were 7.81 and 62.5 mg/ml, respectively. As the concentration increased, antibacterial activity increased as well ($P \leq 0.05$).

Conclusion: The results of this study showed the synergistic antibacterial effects of *lemon balm* and mouthwash on bacteria. More *in vivo* researches are needed to confirm and use the above combination.

Keywords: Antibacterial effect Melissa officinalis L. MouthwashN Streptococcus mutant